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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/750,402	12/28/2000	Richard M. Formato	47756-CIP1- DIV (70184)	7849
21874	7590	02/18/2005	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			ALEJANDRO, RAYMOND	
			ART UNIT	PAPER NUMBER
			1745	
DATE MAILED: 02/18/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

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## Office Action Summary

Application No.

09/750,402

Applicant(s)

FORMATO ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 11/24/04 & 12/30/04.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 51-76, 118, 119 and 121-124 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 51-53, 57, 59, 60, 62, 69, 72-76, 118, 119 and 121-124 is/are rejected.
- 7) ☒ Claim(s) 54-56, 58, 61, 63-68, 70 and 71 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Amendment*

The following office action is being submitted in response to the amendments filed on 11/24/04 and 12/30/04. The applicants have overcome the 35 USC 103 rejection. Refer to the foregoing amendment for additional details on applicant's rebuttal arguments. However, the present claims are rejected again over a newly discovered reference. Thus, the present application is finally rejected as set forth hereinbelow and for the reasons of record:

### *Claim Rejections - 35 USC § 103*

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 51-53, 57, 59-60, 62, 69, 72-76, 118-119 and 121-124 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindler et al 4865930 in view of Arnold Jr et al 4714663, and further in view of Linder et al 4720345.

The instant application is directed to a method of producing a composite solid polymer electrolyte membrane wherein the inventive concept comprises the specific materials therefor.

With respect to claims 51, 118-119:

Kindler et al disclose the following (claims 1-4):

- 40 What is claimed is:
1. A method for forming a membrane comprising gas-permeable regions and ion permeable regions, said method comprising the steps of:
    - 45 (a) providing a substrate comprising a porous ion-impermeable polymer;
    - (b) fully impregnating said substrate with a chosen polymeric ion-conducting material to provide a composite of regions of said ion-conducting material throughout said substrate;

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50 (c) stretching said composite to produce pores in said  
substrate to provide for the passage of gas and to  
thereby form said membrane comprising regions of  
said ion-conducting material juxtaposed to said  
gas-permeable regions formed by said pores in said  
55 substrate.

2. The method of claim 1 wherein said substrate is  
selected from the group consisting of porous polytetra-  
fluoroethylene, porous polypropylene, and porous  
polysulfone.

60 3. The method of claim 1 wherein said polymeric  
ion-conducting material is selected from the group con-  
sisting of a cation exchange material, an anion exchange  
material, and a cation and anion exchange material.

4. The method of claim 3 wherein said polymeric  
65 ion-conducting material is selected from the group con-  
sisting of a polymer of polytetrafluoroethylene with  
fluorinated ether side chains terminated with sulfonic  
acid groups, an alkali resistant copolymer of vinyl chlo-

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ride and acrylonitrile with quaternary nitrogen groups,  
and polyethylene with acrylic acid radiation grafted  
thereon.

As for claims 52-53, 121-122:

It is further disclosed that the system is particularly useful because of its relatively low  
operating temperatures i.e. 250°C. Thus, it is noted that the system components are to be  
thermally stable at temperatures below the above one.

Regarding claims 75-76:

It is taught that alternatively, a solution of the polymer in a chosen solvent may be applied  
to the surface of the substrate, with subsequent removal of the solvent (col 3, lines 60-64);  
wherein the solvent is an alcohol blend solvent (col 4, lines 65-68); wherein the membrane was  
placed in contact with dimethylsulfoxide (col 5, lines 4-8).

On the subject of claims 72-74:

It is disclosed that the partially wet composite is dipped into a catalyst material, which  
then becomes attached to the surface of the partially wet composite, upon completion of the

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drying process, the catalyst material is adhered to the surface of the composite (col 5, lines 60-68). It is noted that by dipping the wet composite into the catalyst material as mentioned above fractions of degraded material is removed therefrom.

Kindler et al disclose a method for forming a membrane according to the foregoing description. However, Kindler et al does not expressly disclose the casting process and the specific substrate and ion-conducting material.

As for claims 51 and 118-119, 123:

Arnold Jr et al disclose a preparation step of a composite membrane including casting the membrane itself (Examples 1-2) wherein the membrane is an oxidative resistant, conductive, ion-selective membrane comprising a catenated aromatic polymer (claim 1); and wherein the membrane comprises a sulfonated aromatic polysulfone (claim 2).

As to claims 57, 59-60, 62:

The membrane is an oxidative resistant, conductive, ion-selective membrane comprising a catenated aromatic polymer (claim 1); and wherein the membrane comprises a sulfonated aromatic polysulfone (claim 2).

With reference to claim 69:

It is disclosed that the aromatic polymers are used either with or without linking groups including polyphenylene or its oxide (col 3, lines 50-54).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to cast the membrane of Kindler et al as taught by Arnold Jr et al as Arnold Jr et al teach that by casting the resin solution a releasable substrate exhibiting an improved area resistivity is obtained.

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As for the specific substrate and ion-conducting material, it would have been obvious to one skilled in the art at the time the invention was made to use the specific substrate and ion conducting material of Arnold Jr et al in the membrane of Kindler et al as Arnold Jr et al disclose that for batteries containing strong oxidizing electrolyte and a membrane separating electrolyte solutions, a membrane fabricated from an aromatic polymer and/or a sulfonated polysulfone provides an improved oxidative resistant, conductive, ion selective membrane.

Additionally, neither Kindler et al nor Arnold Jr et al expressly disclose the step of preparing a common solution of the substrate polymer and the ion-conducting material; and the specific casting/extruding sequence.

Linder et al disclose a process for the manufacture of membranes per se (TITLE). In particular, Linder et al teach that there are two main methods for manufacturing membranes: either one casts a so-called unmodified polymer onto a support to form a membrane which is then chemically modified, or in an alternative route a polymer containing reactive groups is used in the casting solution to prepare the membrane (COL 7, lines 48-55).

**With respect to the foregoing there are however two main methods for manufacturing the inventive membranes: either one casts a so-called unmodified polymer 50 onto a support to form a membrane which is then chemically modified or in an alternative route a polymer containing "reactive groups" is used in the casting solution to prepare the membrane which is then modified further. 55**

Specifically, Linder et al disclose a process for the manufacture of the membrane comprising casting a solution containing (I) a polymer itself and (II) a polar organic solvent or

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solvent mixture for the polymer and optionally electrolytes, inter-alia, on a porous support into a membrane (COL 7, lines 55-65) (← Emphasis Added).

**Therefore—and this is a further object of the present invention—one process for the manufacture of the inventive semipermeable membranes comprises casting a solution containing (I) a polymer on the basis of (poly)s-  
tyrene and (II) a polar organic solvent or solvent mix- 60  
ture for the polymer and optionally partial solvents,  
non-solvents, electrolytes and/or surfactants on a (po-  
rous) support into a membrane, contacting the mem-**

*Examiner's note: in this instance, the electrolyte represents the ion-conducting material.*

*Thus, Linder et al's at once envisage the specific step (in the process for the manufacture of the membrane) of preparing a common solution of the substrate polymer and the ion-conducting material (the electrolyte), and thereafter casting it as instantly claimed.*

In view of the aforementioned, it would have been obvious to one skilled in the art at the time the invention was made to perform the step of preparing a common solution of the substrate polymer and the ion-conducting material of Linder et al to make the membrane of both Kindler et al nor Arnold Jr et al as Linder et al disclose that such a common solution preparation step is one of two main methods for manufacturing membranes characterized by showing good permeability (flux) and rejection characteristics as well as improved solvent, heat, compaction and temperature resistance. *Accordingly, it is apparent from Linder et al's disclosure that such a common solution preparation step is conventionally employed in the membrane manufacturing field because it produces membranes exhibiting the foregoing characteristics. Furthermore, Linder et al is found to be pertinent to the combination of Kindler et al-Arnold Jr et al as well as to applicant's invention simply because Linder et al disclose processes for manufacturing*

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*polymer membranes per se, and hence, those of ordinary skill in the art would obviously recognize that they all are within the same field of endeavor.*

With respect to the specific casting/extruding sequence, it would have been obvious to one skilled in the art at the time the invention was made to perform the specific casting/extruding sequence to make the solid polymer of both Kindler et al and Arnold Jr et al as changes in sequence of adding ingredients has been held to render a prima facie case of obviousness, consequently, it is still contended that reversing the order of the prior art process steps (*Ex parte Rubin* 128 USPQ 440); selection of any order of performing process steps (*In re Burhans* 69 USPQ 330); or selection of any order of mixing ingredients (*In re Gibson* 5USPQ 230) are prima facie obvious in the absence of new or unexpected results (See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale: IV. Changes in Sequence of Adding Ingredients).

*Allowable Subject Matter*

3. The following is a statement of reasons for the indication of allowable subject matter: it was set forth in a prior office action dated 03/27/03.
4. Claims 54-56, 58, 61, 63-68 and 70-71 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.



***Response to Arguments***

1. Applicant's arguments with respect to the foregoing claims have been carefully considered but are moot in view of the new ground(s) of rejection.
2. Although believed unnecessary due to the new grounds of rejection, the examiner wishes to formally state that a upon careful consideration of the Linder et al reference and in view of their teachings, it was found that applicant's claimed method of producing the composite solid polymer membrane by specifically preparing a common solution of the substrate polymer and the ion-conducting material is conventionally known in the field of making/manufacturing polymer membranes. Therefore, the preparation of a common solution thereof before processing (i.e. casting/extruding) the composite is not novel at all. Having shown that, it is now strenuously contended that changes in sequence of adding ingredients has been held to render a prima facie case of obviousness, consequently, it is still contended that reversing the order of the prior art process steps (Ex parte Rubin 128 USPQ 440); selection of any order of performing process steps (In re Burhans 69 USPQ 330); or selection of any order of mixing ingredients (In re Gibson 5USPQ 230) are prima facie obvious in the absence of new or unexpected results (*See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale: IV. Changes in Sequence of Adding Ingredients*).

***Conclusion***

3. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro  
Examiner  
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A handwritten signature in black ink, appearing to be 'Raymond Alejandro', written over a horizontal line.